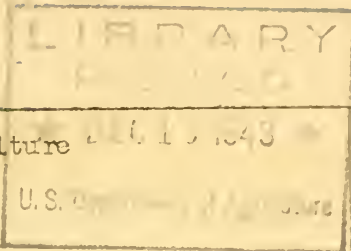


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PRINCIPLES OF BREEDING RABBITS

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Introduction

The breeding of domestic rabbits for meat and fur is of such proportions in the United States as to be considered an important industry. The animals respond readily to good treatment and can be housed in small areas. They have been and will continue to be popular for raising as pets and as a hobby, and increasing numbers are being grown for laboratory and biological purposes. The growing of rabbit wool is a recent phase of the industry, but it is still in its infancy. Regardless of the type of production in which a breeder may be engaged, the underlying principles of breeding are the same, and an understanding of the fundamentals involved will make for efficiency in breeding operations and add materially to the satisfaction of growing rabbits.

Germ Cells and Fertilization

The female egg cells, which are microscopic in size, develop and are released into the fallopian tubes and uterus through ruptures occurring in the walls of the ovaries. In the rabbit, several egg cells are usually released at one time; consequently, the size of the litter is determined by the number that mature and are fertilized at a given period, and develop to birth. Reproduction begins when the egg cells are fertilized by the male sperm cells. These newly formed bodies, or fertilized eggs, become attached to the walls of the uterus, where they develop.

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At each mating, a vigorous normal buck deposits many thousands of sperm cells. The excessive number produced is a provision by Nature to insure fertilization, for only one sperm cell unites with one egg cell. Consequently, more than one service to supply additional sperm cells is not necessary, and if some other condition prevents conception, two or more services will not overcome the difficulty. Moreover, there is a distinct disadvantage in allowing more than one service, for excessive use lowers the buck's vitality.

Heat Period, or Oestrus

The fact that other farm animals have regular recurring "heat periods," or oestrous cycles, has led some rabbit breeders to believe that the rabbit also has corresponding regular cycles. In the case of the mare, cow, sow, and sheep, the egg cells are matured in the ovaries and are discharged at regular periods, which are associated with the oestrus. In the mare, cow, and sow, the periods occur in cycles of approximately 21 days; in the sheep, the cycle is 5 days shorter. In the rabbit, however, the eggs are continually developed in the ovary but are not released until mating has occurred or the doe has become sexually stimulated. The follicles in the surface of the ovaries rupture and release the egg cells about 10 hours after mating, so that instead of does having regular oestrous cycles, they remain in heat for a considerable period. Indications of this condition are restlessness and nervousness, efforts to join other rabbits in nearby hutches, and rubbing the chin against the feed manger and water crocks. If the breeding animals are sexually mature and in proper breeding condition, and not diseased or in molt, matings can be made over an extended period.

Age to Breed

The proper age for the first mating of bucks and does depends on the breed and the individual development. The smaller breeds develop more rapidly and are sexually mature at a much younger age than the medium-weight or the giant breeds. Does should be mated when they are coming into maturity. Some difficulty may be experienced in getting them bred if mating is too long delayed. On the average, the smaller breeds may be bred when the bucks and does are 5 to 6 months old; the medium-weight breeds at 7 months, and the giant breeds at 9 to 12 months. Some individuals within a breed will develop more rapidly than others; therefore, in determining the proper time for the first mating, maturity for the individual is more important than age.

False Pregnancy

Does may be bred or stimulated sexually and shed the egg cells, but fail to become pregnant. False pregnancy may be due to an infertile mating or a sexual excitement caused when does ride other does. Whether riding or ridden, they may become "false pregnant" and cannot conceive until the period is over. The false-pregnancy condition continues for 17 days. After 18 to 22 days the doe may give evidence of the termination of the false-pregnancy period by pulling fur and attempting to make or build a nest.

Breeding Schedule

The breeding schedule to be followed will be determined by the type of production. It would probably be best not to attempt to produce more than two or three litters a year in raising animals for show purposes. The time for matings should then be so arranged that the offspring will be of proper age and development for the show classification. In commercial production for meat and fur, the breeding animals should be worked if possible throughout the year. With the gestation period 31 or 32 days and the nursing period 8 weeks, this requires mating the does at the time the litters are weaned. If no failures occur, it is thus possible to produce four litters in a 12-month period. If the size of the litter is materially reduced for any reason, the doe may be rebred earlier than called for by the regular schedule.

The condition of the individual animal should be used as an index for the proper time of mating. If, upon weaning the litter the doe is reduced materially in physical condition, she should be allowed to rest for a period in order to regain proper breeding condition before mating.

Making Matings

Before mating, both the doe and the buck should be examined to make sure that they are free of disease.

The doe should always be taken to the buck's hutch for service. Difficulty will often be experienced if this procedure is reversed, because the doe is very likely to object to another rabbit being placed in her hutch, and may be savage and attack and injure the buck. Bucks are slow also in making a service in a strange hutch.

For best results, there should be as little confusion as possible and the doe should be handled gently. Undue excitement is likely to make her nervous if she is inclined to be timid.

Mating should occur almost immediately on placing the doe in the buck's hutch. After the buck mounts and falls over on his side mating is accomplished, and the doe should be returned to her own hutch.

Occasionally it may be difficult to get a doe to accept service. In such cases it will be necessary to restrain her for mating purposes, as illustrated in figure 1, which shows the proper method for holding her. The right hand is used to hold the ears and a fold of the skin over the shoulders; the left hand is placed under the body and between the hind legs. The thumb is placed on the right side of the vulva, the index finger on the left side, and the skin pushed gently backward. This procedure throws the tail up over the back. The weight of the body is supported by the left hand and the rear quarters are elevated only to the normal height for mating.

Bucks accustomed to being handled will not object to such assistance by the attendant. It is well also to hold the doe in this way for the first few times that a young buck is used. This practice will expedite matings and will insure ready service in difficult cases.

With a little patience and practice, the breeder can so develop the technique under this system as to insure 100 percent matings. This does not mean, however, that all the does will kindle, but it will help materially in increasing the percent of those that will, for a great many matings will be made that otherwise would not have been accomplished.

One buck should be maintained for each ten breeding does. Mature, vigorous bucks may be used two or three times a week for short periods of time. A breeding record should be made showing date of mating and name or number of the buck and the doe.

Factors that Prevent Conception, and Remedies

Among the causes of failure to conceive are age, false pregnancy, poor physical condition, season, sore hocks or injury, disease, molting, and sterility.

Age.--Young does may not be sexually mature at the time of service, and old does may have passed their period of usefulness and fail to conceive. The first mating should not be attempted until the does are sexually mature and properly developed. The proper age for first mating has been indicated under the heading "Age to Breed." Does should reproduce satisfactorily as long as they maintain good physical condition and satisfactorily nurse their litters. In commercial herds, does properly cared for should breed until they are 2 1/2 to 3 years old. Occasionally, individuals may reproduce satisfactorily until they are 4 to 6 years of age.

False pregnancy.--Does that pull fur and build a nest 18 to 22 days following mating may have passed through a false pregnancy period and should be test mated, as later described.

Physical condition.--Does and bucks that are either abnormally fat or thin will have their breeding powers impaired materially or may become temporarily sterile. The condition should be corrected by adjusting the ration and delaying breeding until the animals are in proper condition.

Season.--Early spring is the normal breeding season for the rabbit; consequently, a higher percentage of conception will occur at this time of the year than at others. At the United States Rabbit Experiment Station, at Fontana, Calif., the highest percentage of conception occurs during the months of February and March and the lowest in August, September, and October.

Sore hocks and injuries.--Sore hocks and injuries that affect a rabbit's vitality should be corrected before any mating is attempted. When the does are out of condition, the percentage that conceive will be very low.

Disease.--Rabbits should never be mated when they show any symptoms of disease. Remove such animals from the herd and hold them in quarantine until they have completely recovered.

Molting.--Molting is normally in fall, and the percentage of conceptions occurring then is small. At this time of the year rabbits are low in vitality, because of the heavy spring production, the heat of summer, and the additional strain of molting.

The feeding and management practices throughout the year will have an influence on breeding during the molting period. Adequate and properly fed rations will keep the rabbit in the best possible condition, and the molting period in well-fed animals will be much shorter than when the ration has been unsatisfactory. Proper feeding will assist the rabbits again to attain good physical condition, and when they are in full coat, many breeding difficulties will be automatically overcome.

Sterility.--Occasionally a sterile rabbit will be encountered, and other individuals may be rendered temporarily sterile by one or more of the factors already discussed. The breeder should study each individual case carefully and if possible remove the cause for his does failing to conceive. Individuals that fail to respond to treatment should be discarded.

Test mating

Test mating is the returning of the doe to the buck's hutch at stated intervals to determine whether or not she has conceived. If on placing the doe in the hutch she "growls" and avoids the buck, it is a fairly good sign that she is pregnant.

The breeder of show animals who is making matings for kindling at a definite time, and the commercial breeder who is interested in keeping his does working as much of the year as possible, can use the test-mating system to good advantage. The practice saves time and feed.

All does should be test mated when they pull fur and attempt to make nests 18 to 22 days following mating (false-pregnant does), when they prepare their nests several days in advance of the correct time for kindling and fail to keep the nests clean, and when they fail to take on flesh and show signs of pregnancy.

In view of the fact that a number of does that are bred and fail to conceive may experience false pregnancy and cannot conceive during its 17-day period, testing mating on the 18th day following mating will be likely to detect the largest number of does that have failed to conceive. Does may also be test mated at other times, and it may pay to test mate a few days following mating, as well as on the 18th day.

Gestation Period

The gestation period, or the period from mating to kindling, is 31 or 32 days. A very small percentage of litters may be kindled as early as the 29th day or as late as the 35th, but 98 percent of the normal litters will be kindled between the 30th and 33d days.

Inbreeding

Many rabbit raisers are concerned about the desirability of inbreeding, that is, mating animals that are closely related. The average breeder should not attempt inbreeding for the following reasons:

Inbreeding knows no favorites. It will intensify poor qualities just as readily as good qualities. The average breeder has not the ability to judge exceptional qualities in his breeding stock, nor does he usually have the necessary knowledge of its previous history to predict what may be expected. Inbreeding is not itself harmful, but it is rapid and effective in revealing the genetic structure and makeup of living forms. It will always remain a most potent procedure in developing and improving any breed of rabbits; in fact, no procedure other than close mating with rigid selection can be relied upon unfailingly to fix a type. Inbreeding, however, is a two-edged sword, one with which the ordinary rabbit raiser cannot afford to play. Discarding all undesirable forms, which is a necessary but expensive part of inbreeding, requires courage and financial resources.

Eliminating the Woolly Character

The Angora breed of rabbits has been developed primarily for the purpose of producing wool, and in this case the woolly character is desirable.

Occasionally a woolly appearing rabbit results from breeding normal-coated rabbits, and in this case the woolly is undesirable. The woolly pelt has a very low value in the fur trade; consequently, the breeder who is producing normal-coated rabbits should eliminate this character from his stock.

Woolly in rabbits is a recessive character and can be easily determined by test mating. Mating a woolly rabbit (and therefore pure for this character) with a rabbit of normal coat but suspected of carrying the woolly factor will establish whether the normal-coated rabbit is actually a carrier. If any young rabbits produced by this mating have a woolly appearance, one can be certain that although the parent being test mated has itself a normal coat it is carrying the woolly factor and should be eliminated. Only bucks and does that have been test mated for the woolly factor and found free of this character should be used for breeding.

Full details relative to the inheritance of the woolly factor in rabbits are given in Leaflet BS-73, which may be obtained from the Bureau of Biological Survey, Department of Agriculture, Washington, D. C., or the United States Rabbit Experiment Station, Fontana, Calif.



FIGURE 1.--Restraining a doe for mating purposes.

